

<b>Dataset Expocode</b>	<b>09FS20091009</b>
<b>Primary Contact</b>	<b>Name:</b> Bronte Tilbrook <b>Organization:</b> CSIRO Oceans and Atmosphere <b>Address:</b> PO Box 1538, Hobart Tasmania 7001 Australia <b>Phone:</b> +61 3 6232 5273 <b>Email:</b> bronte.tilbrook@csiro.au
<b>Investigator</b>	<b>Name:</b> Tilbrook, Dr. Bronte <b>Organization:</b> CSIRO Oceans and Atmosphere <b>Address:</b> PO Box 1538 Hobart TAS 7001 Australia <b>Phone:</b> <b>Email:</b> bronte.tilbrook@csiro.au
<b>Investigator</b>	<b>Name:</b> van Ooijen, Dr. Erik <b>Organization:</b> CSIRO Oceans and Atmosphere <b>Address:</b> PO Box 1538 Hobart TAS 7001 Australia <b>Phone:</b> <b>Email:</b> erik.vanooijen@csiro.au
<b>Investigator</b>	<b>Name:</b> Neill, Craig <b>Organization:</b> CSIRO Oceans and Atmosphere <b>Address:</b> PO Box 1538 Hobart TAS 7001 Australia <b>Phone:</b> <b>Email:</b>
<b>Investigator</b>	<b>Name:</b> Sutton, Dr. Adrienne <b>Organization:</b> NOAA-PMEL <b>Address:</b> 7600 Sand Point Way NE Seattle WA 98115 USA <b>Phone:</b> <b>Email:</b> adrienne.sutton@noaa.gov
<b>Investigator</b>	<b>Name:</b> Sabin, Dr. Christopher <b>Organization:</b> NOAA-PMEL <b>Address:</b> 7600 Sand Point Way NE Seattle WA 98115 USA <b>Phone:</b> <b>Email:</b>
<b>Dataset</b>	<b>Funding Info:</b> Australian Climate Change Science Program <b>Initial Submission (yyyymmdd):</b> 20160202 <b>Revised Submission (yyyymmdd):</b>
<b>Campaign/Cruise</b>	<b>Expocode:</b> 09FS20091009 <b>Campaign/Cruise Name:</b> Heron Island_1 <b>Campaign/Cruise Info:</b> <b>Platform Type:</b> <b>CO2 Instrument Type:</b> Equilibrator-IR or CRDS or GC <b>Survey Type:</b> Moored Buoy <b>Vessel Name:</b> Heron Island <b>Vessel Owner:</b> CSIRO <b>Vessel Code:</b> 09FS
<b>Coverage</b>	<b>Start Date (yyyymmdd):</b> 20091009 <b>End Date (yyyymmdd):</b> 20100419 <b>Westernmost Longitude:</b> 151.9265 E <b>Easternmost Longitude:</b> 151.9270 E <b>Northernmost Latitude:</b> 23.4584 S

**Southernmost Latitude:** 23.4589 S

**Variable**

**Name:** DATE

**Unit:** YYYY-MM-DD hh:mm:ss

**Description:** date and time of measurement

**Variable**

**Name:** LATITUDE

**Unit:** degree +ve=N

**Description:**

**Variable**

**Name:** LONGITUDE

**Unit:** degree +=E

**Description:**

**Variable**

**Name:** xCO2\_dry\_SW

**Unit:** micromol/mol

**Description:** mole fraction of carbon dioxide (dry) in surface water and at equilibrator temperature and salinity

**Variable**

**Name:** SD\_xCO2\_dry\_SW

**Unit:** micromol/mol

**Description:** standard deviation of 58 determinations over 30 seconds of XCO2\_DRY\_SW at each time stamp

**Variable**

**Name:** XCO2\_DRY\_SW\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for XCO2\_DRY\_SW (good=2, questionable=3)

**Variable**

**Name:** XCO2\_DRY\_AIR

**Unit:** micromol/mol

**Description:** mole fraction of carbon dioxide (dry) in air

**Variable**

**Name:** SD\_XCO2\_DRY\_AIR

**Unit:** micromol/mol

**Description:** standard deviation of 58 determinations over 30 seconds of XCO2\_DRY\_AIR at each time stamp

**Variable**

**Name:** XCO2\_DRY\_AIR\_WOCE\_FLAG

**Unit:**

**Description:** fugacity of carbon dioxide in seawater at sea surface temperature and salinity and 100% humidity

**Variable**

**Name:** fCO2\_WET\_SW

**Unit:** microatmospheres

**Description:**

**Variable**

**Name:** SD\_fCO2\_WET\_SW

**Unit:** microatmospheres

**Description:** standard deviation of 58 calculations over 30 seconds of fCO2\_WET\_SW at each time stamp

**Variable**

**Name:** fCO2\_WET\_SW\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for fCO2\_WET\_SW (2=good, 3-questionable)

**Variable**

**Name:** D\_fCO2

**Unit:** microatmospheres

**Description:** Delta fCO2 = (fCO2\_WET\_SW - fCO2\_WET\_AIR)

**Variable**

**Name:** SD\_D\_fCO2

**Unit:** microatmospheres

**Description:** standard deviation of 58 determinations of D\_fCO2 at each time stamp

**Variable**

**Name:** D\_fCO2\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for D\_fCO2 (2=good, 3-questionable)

**Variable**

**Name:** ATMOSPHERIC\_PRESSURE

**Unit:**

**Description:** atmospheric pressure

**Variable**

**Name:** SD\_ATMOSPHERIC\_PRESSURE

**Unit:**

**Description:** standard deviation of 58 measurements of ATMOSPHERIC\_PRESSURE over 30 seconds at each time stamp

**Variable**

**Name:** ATMOSPHERIC\_PRESSURE\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for ATMOSPHERIC\_PRESSURE (2=good, 3-questionable)

**Variable**

**Name:** EQUILIBRATOR\_PRESSURE

**Unit:** kPa

**Description:** pressure of equilibrator

**Variable**

**Name:** SD\_EQUILIBRATOR\_PRESSURE

**Unit:** kPa

**Description:** standard deviation of 58 measurements of EQUILIBRATOR\_PRESSURE over 30 seconds at each time stamp

**Variable**

**Name:** EQUILIBRATOR\_PRESSURE\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for EQUILIBRATOR\_PRESSURE (2=good, 3-questionable)

**Variable**

**Name:**

**Unit:** degrees centigrade

**Description:** sea surface temperature

**Variable**

**Name:** SEA\_SURFACE\_TEMPERATURE\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for SEA\_SURFACE\_TEMPERATURE (2=good, 3=questionable)

**Variable**

**Name:** EQUILIBRATOR\_TEMPERATURE

**Unit:** degrees centigrade

**Description:** equilibrator temperature

**Variable**

**Name:** EQUILIBRATOR\_TEMPERATURE\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for EQUILIBRATOR\_TEMPERATURE (2=good, 3=questionable)

**Variable**

**Name:** SALINITY

**Unit:**

**Description:** sea surface salinity

**Variable**

**Name:** SALINITY\_WOCE\_FLAG

**Unit:**

**Description:** woce flag for SALINITY (2=good, 3=questionable)

<b>Variable</b>	<b>Name:</b> SUB_FLAG <b>Unit:</b> <b>Description:</b> internal flag used for quality control
<b>Sea Surface Temperature</b>	<b>Location:</b> 1m on mooring next to equilibrator <b>Manufacturer:</b> Sea-Bird Electronics <b>Model:</b> SBE 16plusV2 <b>Accuracy:</b> 0.005 (°C if units not given) <b>Precision:</b> 0.001 (°C if units not given) <b>Calibration:</b> 09/07/2009, factory calibrated before purchase <b>Comments:</b>
<b>Sea Surface Salinity</b>	<b>Location:</b> 1m <b>Manufacturer:</b> Sea-Bird Electronics <b>Model:</b> SBE 16plusV2 <b>Accuracy:</b> 0.01 <b>Precision:</b> 0.003 <b>Calibration:</b> 09/07/2009, factory calibrated before purchase <b>Comments:</b>
<b>Atmospheric Pressure</b>	<b>Location:</b> Sensor is connected to an air block on mooring at 1m above sea level that is vented at the time of measurement <b>Normalized to Sea Level:</b> yes <b>Manufacturer:</b> LICOR <b>Model:</b> LICOR 820 internal sensor <b>Accuracy:</b> 0.5 kPa (hPa if units not given) <b>Precision:</b> 0.01 kPa (hPa if units not given) <b>Calibration:</b> Based on laboratory comparison against Druck DPI 142 pressure indicator that were carried out post deployment <b>Comments:</b>
<b>Atmospheric CO2</b>	<b>Measured/Frequency:</b> Yes, 3 hourly <b>Intake Location:</b> 1m above sea level <b>Drying Method:</b> Silica gel <b>Atmospheric CO2 Accuracy:</b> 2 micromol/mol <b>Atmospheric CO2 Precision:</b> 0.2 micromol/mol
<b>Aqueous CO2 Equilibrator Design</b>	<b>System Manufacturer:</b> Battelle <b>Intake Depth:</b> 1 <b>Intake Location:</b> base of surface mooring buoy <b>Equilibration Type:</b> headspace equilibrator as described in Sutton et al., 2014 <b>Equilibrator Volume (L):</b> 0.1 <b>Headspace Gas Flow Rate (ml/min):</b> 200 <b>Equilibrator Water Flow Rate (L/min):</b> see Sutton et al., 2014 <b>Equilibrator Vented:</b> Yes <b>Equilibration Comments:</b> <b>Drying Method:</b> partial using silica gel, typically 60% humidity and corrected for using real humidity sensor
<b>Aqueous CO2 Sensor Details</b>	<b>Measurement Method:</b> IR <b>Method details:</b> NDIR <b>Manufacturer:</b> LI-COR <b>Model:</b> 820 <b>Measured CO2 Values:</b> xCO2(dry) <b>Measurement Frequency:</b> 2-3 hourly

**Aqueous CO2 Accuracy:** 2 micromol/mol  
**Aqueous CO2 Precision:** 0.2 micromol/mol  
**Sensor Calibrations:** Sensor deployment is checked each three hourly measurement cycle using a zero and span gas. The sensor was checked post deployment against a range of 4 CO2-in-air standards to ensure measurements are within 2 micromol/mol of reference standard values between zero and 450 micromol/mol  
**Calibration of Calibration Gases:** Ship  
**Number Non-Zero Gas Standards:** 1  
**Calibration Gases:**  
 Manufacturer: NOAA Earth Systems Laboratory, USA  
 Gas Cylinder Pressure: pre-deployment, 2000 psi; post-deployment. 1400 psi  
 Span gas CO2-in-air concentration (WMO X2007): 574.47 micromol/mol;  
 Calibration date: 2008-12-02  
 Zero gas reference is generated by circulating air through soda-lime at each measurement cycle.

**Comparison to Other CO2 Analyses:**

**Comments:**

**Method Reference:**

Sutton, A.J., C. L. Sabine, S. Maenner-Jones, N. Lawrence-Slavas, C. Meinig, R. A. Feely, J. T. Mathis, S. Musielewicz, R. Bott, P. D. McLain, H. J. Fought, and A. Kozyr (2014) A high-frequency atmospheric and seawater pCO2 data set from 14 open-ocean sites using a moored autonomous system. Earth System Science Data, 6, 353-366. doi:10.5194/essd-6-353-2014.

**Equilibrator  
Temperature Sensor**

**Location:** Tequ is the same as the Sea Surface Temperature, and is located next to the equilibrator

**Manufacturer:** Sea Bird Electronics

**Model:** SBE 16plusV2

**Accuracy:** 0.005 (°C if units not given)

**Precision:** 0.001 (°C if units not given)

**Calibration:** 09/07/2009, factory calibrated before purchase

**Comments:**

**Equilibrator  
Pressure Sensor**

**Location:** Airblock at about 1m above sea level is used to even the LI-COR pressure sensor

**Manufacturer:** LI-COR

**Model:** 820

**Accuracy:** 5 (hPa if units not given)

**Precision:** 0.1 (hPa if units not given)

**Calibration:** Based on laboratory comparison against Druck DPI 142 pressure indicator that were carried out post deployment

**Comments:** Pequ is considered the same as Patm due to the venting of the LI-COR 820 pressure sensor through an air block at the time of each measurement

**Additional  
Information**

**Suggested QC flag from Data Provider:** NA

**Additional Comments:**

**Citation for this Dataset:**

We rely on users of these data to recognise the effort required to obtain data by citing these data as:

B. Tilbrook, E. van Ooijen, C. Neill, A. Sutton and C. Sabine (2009) Ocean and atmosphere fCO2 timeseries measurements from Wistari Channel, Heron Island, Australia. <http://imos.aodn.org.au/imos123/>.

**Other References for this Dataset:**

<http://imos.aodn.org.au/imos123/>